

1899

G. F. Atkinson

Bulletin 168.

May, 1899.

Cornell University Agricultural Experiment Station.

ITHACA, N. Y.

BOTANICAL DIVISION.

Studies and Illustrations

— OF —

MUSHROOMS: II.



*"By the rose flesh mushrooms, undivulged
Last evening. Nay, in to-day's first dew
Yon sudden coral nipple bulged,
Where a freaked, fawn-colored, flaky crew
Of toadstools peep indulged."
Browning's By the Fireside.*

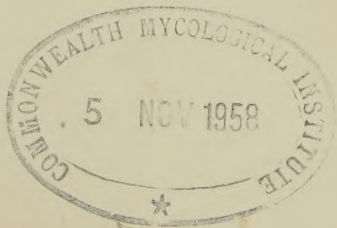
THREE EDIBLE SPECIES OF COPRINUS.

By GEO. F. ATKINSON.

PUBLISHED BY THE UNIVERSITY,

ITHACA, N. Y.

1899.



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CORNELL UNIVERSITY, ITHACA, May 15, 1899.

HONORABLE COMMISSIONER OF AGRICULTURE, ALBANY, N. Y.

Sir: This bulletin, the second of a series of "Studies and Illustrations of Mushrooms," is submitted under Chapter 67 of the Laws of 1898. The object of these studies is to give accurate information upon, and illustrations of, the more common mushrooms or toad-stools. This should enable interested persons to collect and determine specimens occurring from spring to late autumn. Large numbers of the edible species go to waste each year for the want of some clear and ready information to assist in distinguishing the edible from the poisonous kinds.

It is to be regretted that in the smaller cities, in suburban districts, and upon the farms, more attention is not given to learning to know *well* a few of the more common species, since the fields and woods where these plants grow are so easy of access. By careful attention to the localities and by comparison of the plants with the descriptions and illustrations given in these bulletins, a person having no botanical knowledge can identify a number of these plants. Every one has, or should have, a certain amount of leisure time which can be devoted to recreation, or relief from the every day work. Many find enjoyment and profit in combining such recreation with an interest in some observation upon nature and natural objects. Having learned to recognize the edible species, it is possible thereafter to readily collect for food large numbers of the more common ones. Some of these plants are so easily determined that children only eight years old, after seeing the photographs of two of the species illustrated in this bulletin, were able later to name the plants from freshly collected specimens, without the opportunity of a comparison with the photographs.

One not familiar with the subject should use caution in the first collections of an unknown plant. It is well in some cases

to consult some one who does know the plants, or who has the means of determining them. In such cases, the Botanical Division of this Station is ready to assist in the identification. Directions for collecting and mailing specimens are given in the present bulletin. With some attention to this subject there is no reason why, in America, mushrooms should not form as important an article of food as they do in parts of the Old World.

Professor Atkinson has made a large number of photographs of the edible and poisonous mushrooms, as well as of those wood destroying species so destructive to timber and forest trees.

I. P. ROBERTS, Director.

STUDIES AND ILLUSTRATIONS OF MUSH- ROOMS, II.

Three Edible Species of Coprinus.

I—THE SHAGGY-MANE (*Coprinus comatus*).

The "shaggy-mane," or "horsetail mushroom" (*Coprinus comatus*), is one of the largest plants of this genus. It is usually considered by many to surpass all the other species of the genus in those qualities most esteemed by the fungus eater. The frontispiece is from a photograph of a group of these plants growing in a lawn on the Cornell University Campus. All stages of the "horsetail" are here represented, from the tiny ones which are thrusting their heads through the turf to the old ones which present an unsightly aspect as they are melting down into inky blackness, an example of the swiftness with which it passes its ephemeral existence. A day, or at most two or three days is vouchsafed to it during which it is to lift itself up into the free air, where it may expand and mature its spores. Then it vanishes. But it has accomplished the final purpose for which it exists as an organism. Its "seed," the spores are free to be carried by the wind or other agencies of dissemination to distant places, and thus propagate the species. While the natural mode of the wide dissemination of the plant is probably by the distribution of the spores, dissemination may take place through the agency of man or other animals when the soil is disturbed.

Some of the "spawn" may be transplanted in the sod for covering new lawns, or in the fertilizer for old ones. Here food lying hidden in the soil is awaiting forage at the pleasure of the searching threads of the mycelium or "spawn," which now spreads its meshes as it extends through the earth. Here it grows for months or sometimes for years may be, laying by supplies in the shape of an increased amount of "spawn." We tread upon the soft carpet of green or recline on the sod unmind-

ful of the process of growth, absorption and assimilation in that wonderful unseen world of plant life. Suddenly some morning we see the shaggy, unkempt heads of our old friends again just risen from their long sleep which calls to mind Browning's verse,—

“By the rose flesh mushrooms undivulged
Last evening. Nay, in to-day's first dew
Yon sudden coral nipple bulged,
Where a freaked, fawn-colored flaky crew
Of toad-stools peep indulged.”

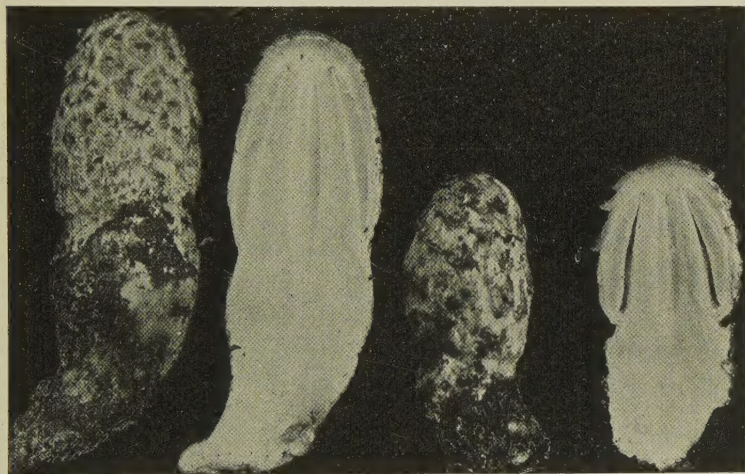


83.—“Shaggy-mane” (*Coprinus comatus*) in lawn.

A “mushroom growth,” we say. It looks that way; as if the whole thing had grown in a single night. That is because we have not searched underneath the sod and observed the long, tedious process of growth while the cords and meshes of the mycelium have increased, and extended their lines through the moist soil. If we do search there and observe we see that sometime before the shaggy heads peep forth, tiny bodies appear on the cords of mycelium; first like a pin head in size, then as large as a pea and the size of a thimble they grow. A great deal of

growth has taken place in the formation of these tiny bodies beneath the soil. They are made up of delicate threads and the tiniest cells which have multiplied until there are countless numbers of them. Now when every thing is ready in these fungus "buttons," the tiny cells already formed, as well as new ones still forming, expand rapidly and this pushes the mushroom up into view in a single night.

In figure 84 are shown two buttons of the size when they are just ready to break through the soil. They are now quite dark

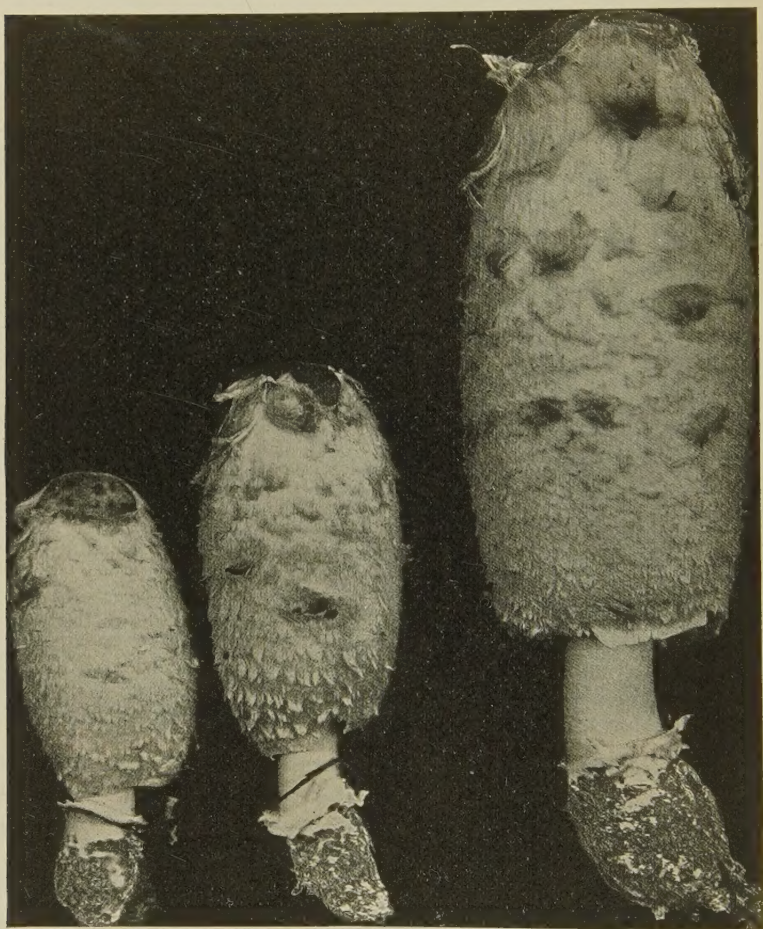


84.—"Buttons" of *Coprinus*; two in section, showing gill slits and hollow stem. (Natural size.)

in color on the outside. They appear mottled with dark and white, for the outer layer of fungus threads, which are dark brown, is torn and separated into patches or scales, showing between, the delicate meshes of white threads which lie beneath. The upper part of the button is already forming the cap or "pileus," and the slight constriction about midway shows the lower boundary or margin of the pileus where it is still connected with the undeveloped stem.

We are curious to know if the internal structure of these buttons will reveal the parts of the mushroom. We can learn this by splitting buttons through from one end to the other with a

sharp knife. At the right of each of these buttons in the figure is shown a section of a plant of the same age. Here the parts of the plant though still undeveloped are quite well marked out. Just underneath the pileus layer are the gills. In the section



85.—*Coprinus comatus*, removed from soil. (Natural size.)

one gill is exposed to view on either side. They are long, narrow, and taper at each end. In the section of the larger button the free edge of the gill is still closely applied to the stem, while in

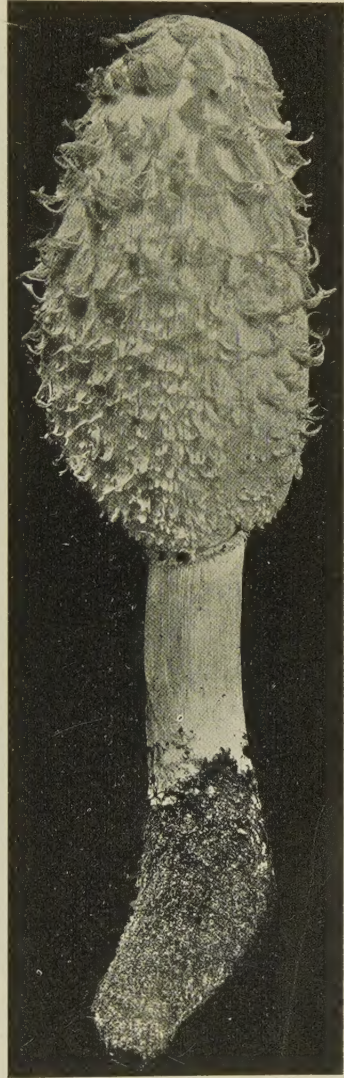
the small one the gills are separated a short distance from the stems showing "gill slits."

Here, too, the connection of the margin of the pileus with the stem is still shown. From our first study of mushrooms (Bulletin 138) we know that this connecting layer between the margin of the pileus and stem forms the veil. This kind of a veil is a marginal veil.

The stem is hollow even at this young stage, and a slender cord of mycelium extends down the center of the tube thus formed as is shown in the sections. From the button stage the growth is quite rapid, and in a short while the plants are full grown.

Now the plants are nearly all white. The brown scales so close together on the buttons are widely separated except at the top or center of the pileus, where they remain close together and form a broad cap resting jauntily on the shaggy head. This is shown in figure 85 which is from a photograph of three plants removed from the sod.

A study of the different stages, which appear from the button stage to the mature plant, reveals the cause of this change in color and the wide separation of the dark brown scales. The threads of the outer layer of the pileus, and especially those in the brown patches seen on the buttons, soon



86.—*Coprinus comatus*, well meriting the name "shaggy mane". (Natural size.)

cease to grow, though they are firmly entangled with the inner layers. Now the threads underneath and all through the plant, in the gills and in the upper part of the stem grow and elongate rapidly. This pulls on the outer layer tearing it in the first place into small patches and causing them later to be more widely



87.—*Coprinus comatus*, surface of pileus gathered in lumps. (Natural size).

separated on the mature plant. Some of these scales remain quite large while others are torn up into quite small tufts. As the plant ages, the next inner layers of the pileus grow less rapidly, so that the white layer beneath the brown is torn up into an intricate tangle of locks and tufts, or is frazzled into a delicate pile which exists here and there between well formed tufts. While all present the same general characters there is considerable individual variation as one can see by comparing a number of different plants. Figure 86 shows one of the interesting conditions. There is little of the brown color, and the outer portion of the pileus is torn into long locks, quite evenly distributed and curled up at the ends in an interesting fashion which merits well the term "shaggy." In others the threads are looped up quite regularly into triangular tresses which appear to be knotted at the ends where the tangle of brown threads holds them together as if some fairy had plaited the lock.

There is one curious feature about the expansion of the pileus

of the shaggy-mane which could not escape our attention. The pileus has become very long while comparatively little lateral



88.—*Coprinus comatus*, sections of the three plants shown in figure 85.
(Natural size).

expansion has taken place. The pileus has remained cylindrical or barrel-shaped, while in the case of the mushrooms treated of in our first study the pileus expanded into the form of an umbrella.

The cylindrical or barrel-shaped pileus is characteristic of the shaggy-mane mushroom.

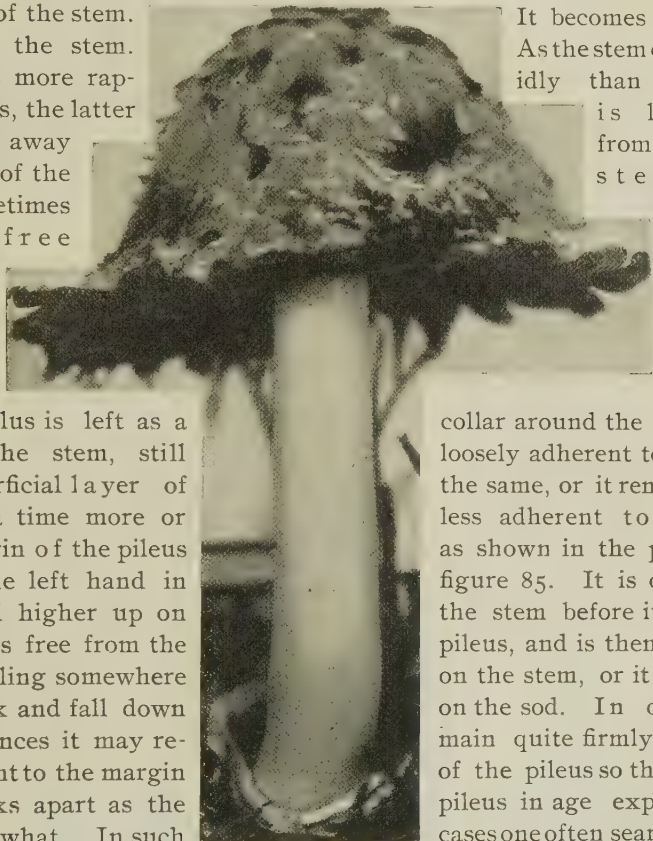


89.—*Coprinus comatus*, early stage of deliquescence.
The ring is lying on the sod. (Natural size.)

remained attached to the stem, *i. e.*, it is not a free ring in those

As the pileus elongates the stem does also, but more rapidly. This tears apart the connection of the margin of the pileus with the base of the stem, as is plainly shown in figure 85. In breaking away, the connecting portion or veil, is freed both from the stem and from the margin of the pileus, and is left as a free, or loose ring, around the stem. In all of the plants of our former study, the common mushroom (*Agaricus campestris*), the smooth lepiota (*Lepiota naucina*), and the deadly amanita (*Amanita phalloides*), the ring

species. In the shaggy-mane the veil does not form a thin expanded curtain as in the three species just enumerated. It is really an annular outer layer of the button lying between the margin of the pileus and the base of the stem. It becomes free from the stem. As the stem elongates more rapidly than the pileus, the latter is lifted up away from the base of the stem. Sometimes the free



annulus is left as a collar around the base of the stem, still superficial layer of the same, or it remains for a time more or less adherent to the margin of the pileus at the left hand in figure 85. It is often lifted higher up on the stem before it becomes free from the dangling somewhere break and fall down in instances it may remain quite firmly adherent to the margin of the pileus so that it breaks apart as the pileus in age expands. In such cases one often searches for some time to discover its outer texture require of the pileus.

90.—*Coprinus comatus*, later stage of deliquescence, pileus becoming more expanded. (Natural size).

serve a section of the plants at this stage. These sections can be made by splitting the pileus and stem lengthwise through the middle line with a sharp knife as shown in figure 88. Here, in

collar around the base loosely adherent to the same, or it remains less adherent to the as shown in the plant figure 85. It is often the stem before it becomes free from the dangling somewhere break and fall down in instances it may remain quite firmly adherent to the margin of the pileus so that it breaks apart as the pileus in age expands. In such cases one often searches for some time to discover its outer texture require of the pileus.

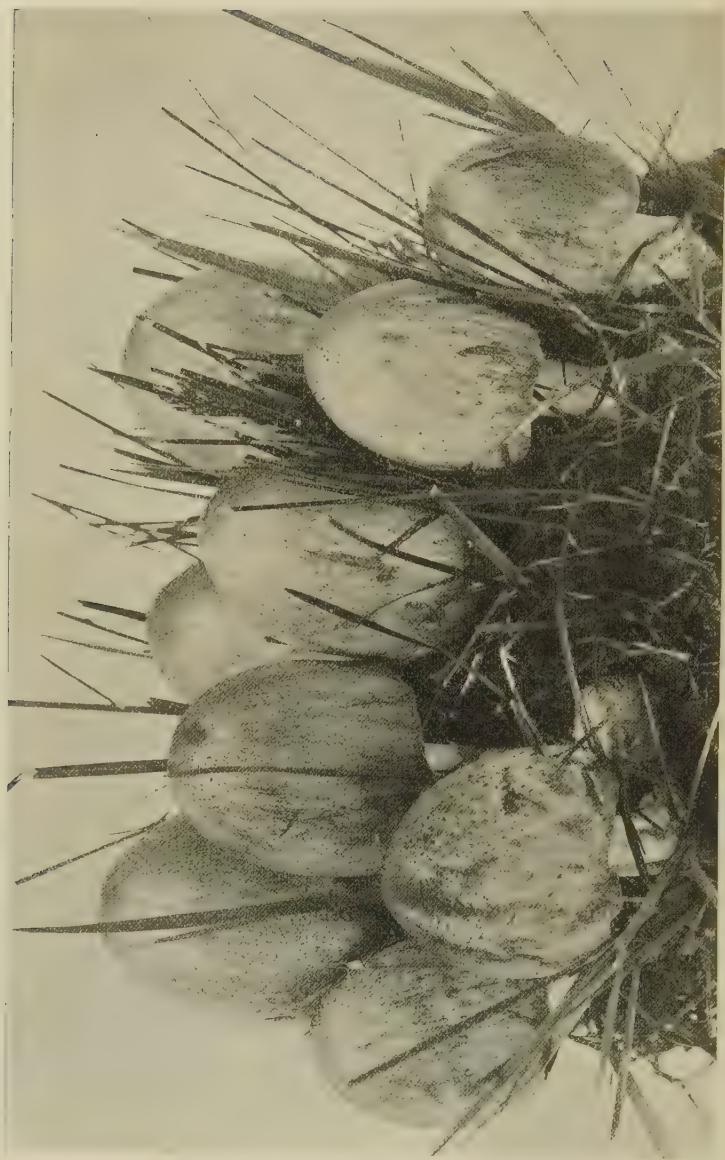
the plant at the right hand, the "cord" of mycelium is plainly seen running through the hollow stem. This cord is well seen



91.—*Coprinus comatus*, drops of inky fluid about to fall from wasted pileus.
(Natural size).

if one partly splits a stem and then gently pulls the halves apart. At the same time if the stem is held toward the light a very delicate mesh of threads, reminding one of the finest gauze, is seen extending from the cord to the wall of the tubular stem. The gills form a large portion of the plant for they are very broad and lie closely packed side by side. They are nowhere attached to the stem but at the upper end round off to the pileus leaving a well defined space between their ends and the stem. The pileus, while it is rather thick at the center, *i. e.*, where it joins the stem, becomes comparatively thin where it spreads out over the gills. At this age of the plant the gills are of a rich salmon color, *i. e.*, before the spores are ripe, and the taste when raw is a pleasant nutty flavor reminding one of the meat of fresh green hickory nuts. In a somewhat earlier stage the edges of all the gills are closely applied to the stem which they surround. So closely are they applied to the stem in most cases that threads of mycelium pass from the stem to the edge of the gills, so that they might be said to be "sewed" together. As the pileus expands slightly in ageing, these threads are torn asunder and the stem is covered with a very delicate down or with flocculent particles which easily disappear on handling or by the washing of the rains. The edges of the gills are also left in a frazzled condition as one can see by examining them with a good hand lens.

The spores now begin to ripen and as they become black the color of the gills changes. At the same time the gills and the pileus begin to dissolve into an inky fluid, first becoming dark and then melting into a black liquid. As this accumulates it forms into drops which dangle from the pileus until they fall away. This change takes place on the margin of the pileus first, and advances toward the center, and the contrast of color, as the blackening invades the rich salmon, is very striking. The pileus now begins to expand outward more, so that it becomes somewhat umbrella shaped. The extreme outer surface of the pileus does not dilliesce so freely, and the thin remnant curls upward and becomes enrolled on the upper side as the pileus with wasted gills becomes nearly flat.



92.—The “ink-cap”, *Coprinus alamentarius*, nearly smooth form. (Natural size).

II.—THE INK-CAP (*Coprinus atramentarius*).

The ink-cap (*Coprinus atramentarius*) occurs under much the same conditions as the shaggy-mane, and is sometimes found accompanying it. It is usually more common and more abundant. It springs up in old or newly made lawns which have been richly



93.—*Coprinus atramentarius*, scaly form. (Natural size.)

manured, or it occurs in other grassy places. Sometimes the plants are scattered, sometimes two or three in a cluster, but usually large clusters are formed where ten to twenty or more are crowded closely together (figure 92). The stems are shorter than those of the shaggy-mane and the pileus is of a different shape and color. The pileus is more egg-shaped or oval. It

varies in color from a silvery grey in a few forms, to a dark ashen grey, or smoky brown color in others. Sometimes the pileus is entirely smooth, as I have seen it in some of the silvery grey



94.—*Coprinus atramentarius*; showing annulus as a border line between scaly and smooth part of stem. (Natural size.)

forms, where the delicate fibres coursing down in lines on the outer surface cast a beautiful silvery sheen in the light. Other forms present numerous small scales on the top or center of the pileus which are formed by the cleavage of the outer surface here into large numbers of pointed tufts. In others, the delicate tufts cover more or less the entire surface, giving the plant a coarsely granular aspect. This is perhaps the more common appearance, at least so far as my observation goes. But not infrequently one finds forms which have the entire outer surface

of the pileus torn into quite a large number of coarse scales, and these are often more prominent over the upper portion. Fine lines or striations mark also the surface of all the forms, especially toward the margin where the scales are not so promi-



95.—*Coprinus atramentarius*, section plant. (Natural size.)

nent. The marginal half of the pileus is also frequently furrowed more or less irregularly, and this forms a crenate or uneven edge.

The annulus or ring on the stem of the ink-cap is very different from that of the shaggy-mane. It forms an irregularly zigzag elevated line of threads which extend around the stem near the base. It is well shown in figure 94 as a border line

between the lower scaly end of the stem and the smooth white upper part. It is formed at the time of the separation of the margin of the pileus from the stem, the connecting fibres being pulled outward and left to mark the line of junction, while others below give the scaly appearance. It is easily effaced by rough handling or by the washing of the rains. A section of a plant is illustrated by a photograph in figure 95. On either side of the stem is shown the layer of fibres which form the annulus, and this layer is of a different texture from that of the stem. The stem is hollow as seen here also. In this figure one can see the change in color of the gills just at the time when they begin to diliquesce. This diliquescence proceeds much in the same way as in the shaggy-mane, and sometimes the thin remnant of the pileus expands and the margin is inrolled over the top.

III.—THE GLISTENING COPRINUS (*Coprinus micaceus*).

The third species described here is the glistening coprinus (*Coprinus micaceus*). It received this name because of the very delicate scales which often cover the surface of the pileus, and glisten in the light like particles of mica. This plant is very



96.—The "glistening coprinus," *Coprinus micaceus*; young stage showing annulus, on the pileus the "mica" particles. (Natural size.)

common during the spring and early summer though it does appear during the autumn. It occurs about the bases of stumps or trees or in grassy or denuded places, from dead roots, etc., buried in the soil. It occurs in dense tufts of ten to thirty or more individuals; sometimes as many as several hundred spring up from the roots of a dead tree or stump along the streets or in lawns, forming large masses. More rarely it occurs on logs in the woods, and sometimes, the plants are

scattered in lawns. From the different habits of the plant it

is sometimes difficult to determine, especially where the individuals are more or less scattered. However, the color of the plant, and the markings on the pileus, especially the presence of the small shining scales when not effaced, characterize the plant so that little difficulty is experienced in determining it when one has once carefully noted these peculiarities.



97.—*Coprinus micaceus*, showing different aspects.
(2-3 natural size.)

Figure 96 is from a group of three young individuals photographed just as the margin of the pileus is breaking away from the lower part of the stem, showing the delicate fibrous ring which is formed in the same way as in *Coprinus atramentarius*. The ring is much more delicate and is rarely seen except in very young specimens which are carefully collected and which

have not been washed by rains. The mature plants are 8 cm. to 10 cm. high (3-4 inches), and the pileus varies from 2 cm. to 4 cm. in diameter. The stem is quite slender and the pileus and gills quite thin as compared with the shaggy-mane and ink-cap. The gills are not nearly so crowded as they are in the two other species. The pileus is tan color, or light buff, or yellowish brown. Except near the center it is marked with quite prominent striations which radiate to the margin. These striations are minute furrows or depressed lines, and form one of the characters of the species, being much more prominent than on the pileus of the ink-cap.

In wet weather this *coprinus* melts down into an inky fluid also, but in quite dry weather it remains more or less firm, and sometimes it does not diliquesce at all, but dries with all parts well preserved though much shrunk of course as is the case with all the very fleshy fungi.

Many persons who are fond of mushrooms do not venture to collect and eat other species than the *Agaricus campestris*. Many will tramp considerable distances to collect the "pink gilled agaric," and pass by on the street, or perhaps in their dooryard, a clump of *coprinus* sufficient for a meal. During the spring and early summer the *Agaricus campestris* is not to be had in the open, while these three species of *coprinus* usually grow in abundance, though the shaggy-mane is usually more abundant in the autumn than in the spring.

During the autumn of 1898 the common "pink gilled mushroom" (*Agaricus campestris*) was very rare in the vicinity of Ithaca. This has led a few to search for other forms. Two of my friends during October brought into my office a peck basket filled with mushrooms, and wished to know if they were "good to eat." Nearly all of the plants were the "ink-cap" (*C. atramentarius*), there were four or five of the shaggy-mane (*C. comatus*), and a single "glistening *coprinus*" (*C. micaceus*). All of them good to eat and collected in a single dooryard. One of these gentlemen had never before ventured to partake of any other species than the *Agaricus campestris*.

During the early summer of 1897, while collecting a "mess"

of *Coprinus micaceus* from a large tuft growing around the base of a stump on one of the principal streets of Ithaca, a passer-by halted, probably for the charitable purpose of giving some information which he thought might save my life. "Them's toad-stools ain't they?" "Yes," I replied. "Well, I thought so," said he. Thereupon I ate one of the "toad-stools" raw, and received from him a look of mingled pity and despair as he passed on.

All of these three species have a somewhat nutty flavor, that of fresh hickory nuts when eaten raw, but they are more palatable when properly prepared for the table. The *Coprinus micaceus* need only be rinsed to remove from the caps any adhering particles of soil. The other two species may be peeled if it is desired to remove the outer and tougher layer of the pileus, or this may be done by gently scraping. The shaggy-mane peels well by starting at the margin of the pileus and with the fingers stripping off the outer layer. The ink-cap peels more readily by first splitting the pileus in halves and then starting the strip at the top of each half. It is sufficient, however, to gently scrape the surface of the pileus to remove the coarser outer fibers and whatever soil may adhere.

To those who are not acquainted with any of the species of coprinus and wish to extend the range of species collected for table use these three species are commended. The shaggy-mane is perhaps the most delicious of the three, but the other two are much more abundant usually. By a careful comparison of the species growing in lawns, and along streets with these descriptions, and especially with the illustrations, there should be no trouble in identifying them. While the camera here has not at present succeeded in reproducing all the colors, this series of photographs illustrates well the habit, texture and specific characters of the plants, and the color values in black and white are quite faithfully represented. It is doubtful if any hand coloring has yet succeeded in producing such perfect imitations as these photographic studies of the shaggy-mane and ink-cap. That they accurately portray the habit and specific characters of these plants I am convinced by the experience of my little boy of eight years. While selecting the illustrations for this study one evening, I

showed him the photographs, told him the names of each and the parts of the mushroom. The subject was not mentioned again until a week later when I brought in a few specimens of one of the species. "What is the name of this?" I said. "That's the shaggy-mane," he said. "What part is this?" "That's the cap." "And this?" "That's the ring." "And this?" "That's the stem." "Now, father," he said, "where's the ink-cap?" At another time he was able to select the ink-cap from among a miscellaneous collection.

While the *Coprinus micaceus* usually grows on decaying wood, or roots, etc., underneath the soil, the shaggy-mane and ink-cap grow in rich soil in grassy places, especially such as have been quite recently manured. This latter peculiarity of growing on manured ground, or on dung, so characteristic of a number of the species of the genus, suggested the name "*coprinus*," from the work "*kopros*," meaning dung.

A large number of the species of the genus, practically all the large fleshy ones (some of the smaller also) diliquesce into an inky fluid. In the delicate or membranous ones, usually quite small species, the pileus splits in radiating lines above each gill in such a way that the gill itself is split downward, thus giving to the pileus a fluted appearance.

In bulletin 138 the writer suggested the formation of mycological clubs as a medium for the exchange of information among interested persons in a given community. At that time there was already in existence among others, the Boston Mycological Club, New York Mycological Club and the Philadelphia Mycological Center. Since that time there have been organized the Washington Mycological Club, Chicago Mycological Club, and others.

CORNELL MYCOLOGICAL CLUB.

A mycological club has recently been organized at Cornell University, with a somewhat broader work in view. It is called the "Cornell Mycological Club" and is under the supervision of the members in the Botanical Department. Its purpose is to study the fungi, to propagate information concerning them among its members, and to encourage the growing popular interest in those

groups of economic importance, to which belong especially the edible, poisonous and parasitic fungi.

The rules governing the club are such that they admit to membership any person interested in its aims and work. No other qualifications except the payment of the small annual fee of twenty-five cents, are necessary, and any person sending name and enclosing the fee will be placed on the membership roll. This small fee is to be used in necessary expenses incurred relating to executive matters of the club, as determined by the Executive Council. With this small fee it will not be possible at present to publish a bulletin of information. It is hoped, however, that it will lead eventually to some medium of communication among members, by which a knowledge of the numerous local fungus floras may be obtained, and that this information as well as other matters of interest may be regularly communicated to members.

It is purposed to make the club a center to which persons interested in the study, and in becoming acquainted with the fungi, may appeal for aid in the determination of species they collect. To this end a few general directions are given here for those who desire to know how to put up specimens properly for mailing, so that they will not be broken or ruined in transit.

HOW TO MAIL FLESHY FUNGI.

Fresh "mushrooms," or "toad-stools" if of medium or large size, should be wrapped separately in tissue paper, or if the plants grow in tufts the paper can be worked in between the individual specimens unless the tuft is a compact one. A sufficient amount of paper should be used to give support to the expanded parts of the plant, and so arranged that delicate structures on the surface will not be rubbed away. The plants should then be packed quite firmly, but not crushed, into a tin box, or a light but strong wooden box. If they do not quite fill it more paper can be added, so that they will not jostle about, or they become badly broken. Pasteboard boxes are apt to become broken and ruin the specimens.

In collecting the mushrooms do not break off the stems, but pry the stems out of the earth carefully in order to preserve all

the characters on the lower end of the stem. Also use care in handling the stems so that the "collar," when present, and the delicate scales, be not rubbed off. The corky or woody fungi growing on trees, logs, stumps, etc., may be wrapped in the same way. In all specimens from logs or trees, the name of the wood should be given when that is accurately known. When the name of the tree is not known a portion of the wood and bark, or some leaves, may accompany the specimen. The corky or woody fungi may be dried before mailing if desired. To dry the fleshy fungi requires considerable care, and usually artificial heat, for they must be dried quickly, not burned or roasted, though careful notes upon the characters of the plants while fresh, should also be made before they are dried, in most cases.

An extemporized oven for drying may be made of tin, with holes in the sides for ventilation. In this the plants can be placed in paper boxes while they are drying. The oven may then be placed above a stove, or a lamp may be placed underneath it. Shelves above a stove where warm air is constantly rising is a good place to dry the plants. The best place that I have ever used is the brick work around a large steam boiler, the plants, or boxes containing them, being placed directly on the brick work. Parasitic fungi on leaves of plants should be dried between absorbent paper under some pressure to keep the leaves from shriveling and curling.

Dried specimens of the mushrooms can be wrapped in tissue paper for shipment. It is better in most cases, however, if the plants are shipped away for determination, to send them in a fresh condition. At least some duplicates are desirable in a fresh condition, since fresh material is often necessary for determination of the species, especially with doubtful species, and in the case of many genera.

When fresh material is mailed, if the sender will use foresight in putting it up and mailing just in time for a mail train which makes good connections through, specimens will usually travel several hundred miles and arrive in a good condition.

Specimens sent by mail require, according to the present postal regulations, 1 ct. per 2 ounces in weight, and the package should be marked "plants." Wherever it is desired to

send by express, the sender should pay the express charges, except where good material prepared and named for the herbarium or museum is contributed, or where the sender is certain that the material is of value, as in the case of some rare specimens. In all cases where a list of the plants is desired in return, the sender should enclose a number with each specimen, so that the names can be given to correspond with the numbers. All desirable material will be preserved and kept in the herbarium here where it will be available for comparison and for study. For this reason the locality and date of collection and other notes of interest should accompany the specimens. After one has had some experience in the collection of these plants and in noting the important characters their specimens will be of more value. It is possible in this way for collectors to aid us in bringing together material from different sources which should assist in making these studies and illustrations of mushrooms more comprehensive and of wider usefulness.

From students of the fungi who have duplicate material in any of the groups, the Botanical Department will welcome contributions to the herbarium. Such gifts are certain to be of great usefulness at a center where students come for research. Not only is this branch of botanical study, as well as others emphasized, it is important to consider that mycological study here contributes to, and is supplemented by, other fields of research in related departments, as well as in the work of the Experiment Station, and in that of the newly organized College of Forestry.

Specimens may be sent to either of the following addresses :

PROFESSOR GEO. F. ATKINSON,

Botanical Department,

Cornell University, Ithaca, N. Y.

or,

CORNELL MYCOLOGICAL CLUB, Ithaca, N. Y.

Persons desiring to join the Club should send name with the annual fee enclosed, to either of the above addresses. The fee should *not be sent in postage stamps*, but preferably in a postal note when in so small a sum, unless the "quarter" is enclosed

in a mailing card for the purpose. The cost of sending will be reduced where several from the same locality choose to send names and fees in a single letter. The exact address should also be given for each person, with the street number where necessary.

Those wishing to take up the study of the fungi would find it profitable to attend some school where suitable opportunities are offered for beginners. A course in mycology* (devoted especially to the mushrooms) will be given during the summer of 1899 in the Botanical Department of Cornell University.

* Besides the course in mycology, courses in general morphology and physiology of plants, as well as a course in ecology are offered in the summer school especially for teachers. The catalog of the summer school can be obtained by addressing, The Registrar, Cornell University, Ithaca, N. Y. A full year's course in mycology is given during the regular annual session of the University as described in the annual Register.

NOTE.—The author was assisted in making some of the photographs illustrating this bulletin, by Mr. H. Hasselbring, and Mr. B. F. White.